LEWISTON ORCHARDS IRRIGATION DISTRICT (PWS 2350015)
SOURCE WATER ASSESSMENT FINAL REPORT

May 14 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Source Water Assessment for Lewiston Orchards Irrigation District, Lewiston, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Lewiston Orchards Irrigation District drinking water system consists of three wells. Well #1, drilled in 1978 and deepened in 1982 is 1,795 feet deep. Well #2, drilled in 1987, is 1,957 feet deep. Well #3 was drilled in 1997 to a depth of 2,617 feet. The system serves approximately 18,000 people through 5,955 connections. Well #1 will be taken offline in the near future and a new well (Well #4) will be drilled in close proximity to it. Until Well #1 is taken offline officially, it will be considered active and will receive a susceptibility rating. In addition, as Well #4 will be located in close proximity to Well #1, it will have identical land use and hydrologic sensitivity scores.

Final susceptibility scores are derived from System Construction scores, Hydrologic Sensitivity scores, and Potential Contaminant/Land Use scores. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, Well #1 and Well #2 rated moderate for IOCs, VOCs, SOCs, and microbials.

In terms of total susceptibility, Well #2 rated moderate for IOCs, automatically high for VOCs, and moderate for SOCs and microbials. The automatically high VOC rating is due a xylene (4/96) detection in the well.

In terms of total susceptibility, Well #3 rated low for IOCs, VOCs, SOCs, and microbials.

Traces of the IOCs barium, chromium, fluoride, magnesium, manganese, potassium, and selenium have been detected in all three wells, but at levels significantly lower than maximum contaminant levels (MCLs). Despite the present and historical agricultural activities surrounding the wellheads, no nitrate has ever been detected in any of the wells. No SOCs have ever been detected in the wells.

Bromodichloromethane, bromoform, and bromomethane are disinfection by-products and were detected in three wells. Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. In 1983, EPA identified some technologies, treatment techniques and plant modifications that water systems could use to reduce the amount of disinfection by-products produced. See http://www.epa.gov/safewater/mdbp/pdf/alter/chapt_2.pdf for disinfection by-product control strategies.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Lewiston Orchards Irrigation District, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Efforts to should be made to reduce the amount of disinfection byproducts in the wells. Actions should be taken to keep a 50-foot radius circle clear of all potential contaminants from around the wellhead. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated protection areas are outside the direct jurisdiction of the Lewiston Orchards Irrigation District, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR
LEWISTON ORCHARDS IRRIGATION DISTRICT, LEWISTON, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The local community, based on its own needs and limitations, should determine the decision as to the amount and types of information necessary to develop a drinking water protection program. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Lewiston Orchards Irrigation District drinking water system consists of 3 wells. Well #1, drilled in 1978 and deepened in 1982 is 1,795 feet deep. Well #2, drilled in 1987, is 1,957 feet deep. Well #3 was drilled in 1997 to a depth of 2,617 feet. The system serves approximately 18,000 people through 5,955 connections.

Traces of the IOCs barium, chromium, fluoride, magnesium, manganese, potassium, and selenium have been detected in all three wells, but at levels significantly lower than allowable limits. Despite the present and historical agricultural activities surrounding the wellheads, no nitrates have ever been detected in any of the wells. No SOCs have ever been detected in the wells. The disinfection by-products Bromodichloromethane, bromoform, and bromomethane were detected in all three wells.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with the University of Idaho to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the basalt aquifer of the Clearwater Plateau in the vicinity of the Lewiston Orchards Irrigation District wells. The computer model used site specific data, assimilated by the University of Idaho from a variety of sources including operator input, local area well logs, and hydrogeologic reports (detailed below).

The Grande Ronde Formation of the Columbia River Basalt Flows provides most of the groundwater pumped in the vicinity of Lewiston because of its great thickness, extensive lateral continuity, and lack of fine-grained interbeds. The Grande Ronde is easily accessible to drilling at the confluence of the Clearwater and Snake Rivers and some of the tributary valleys such as Lapwai Creek where it has been exposed by erosion (Crosswaite, 1989). The Grande Ronde aquifer at Lewiston is called the "Lewiston Aquifer" (EPA, 1988), also referred to as the "Lewiston Basin Deep Aquifer" (Wyatt-Jaykim, 1994).

Lewiston Orchards Irrigation District Well #2 (LOID #2) is modeled in a separate simulation from the other Lewiston Basin Deep Aquifer Wells. It is located in the eastern portion of the Grande Ronde Aquifer, and unlike other wells in the Grande Ronde, underwent significant historic water level decline before stabilizing at its present level (Wyatt-Jaykim, 1994). It is completed in a deeper flow of the Grande Ronde than the other Lewiston area wells.

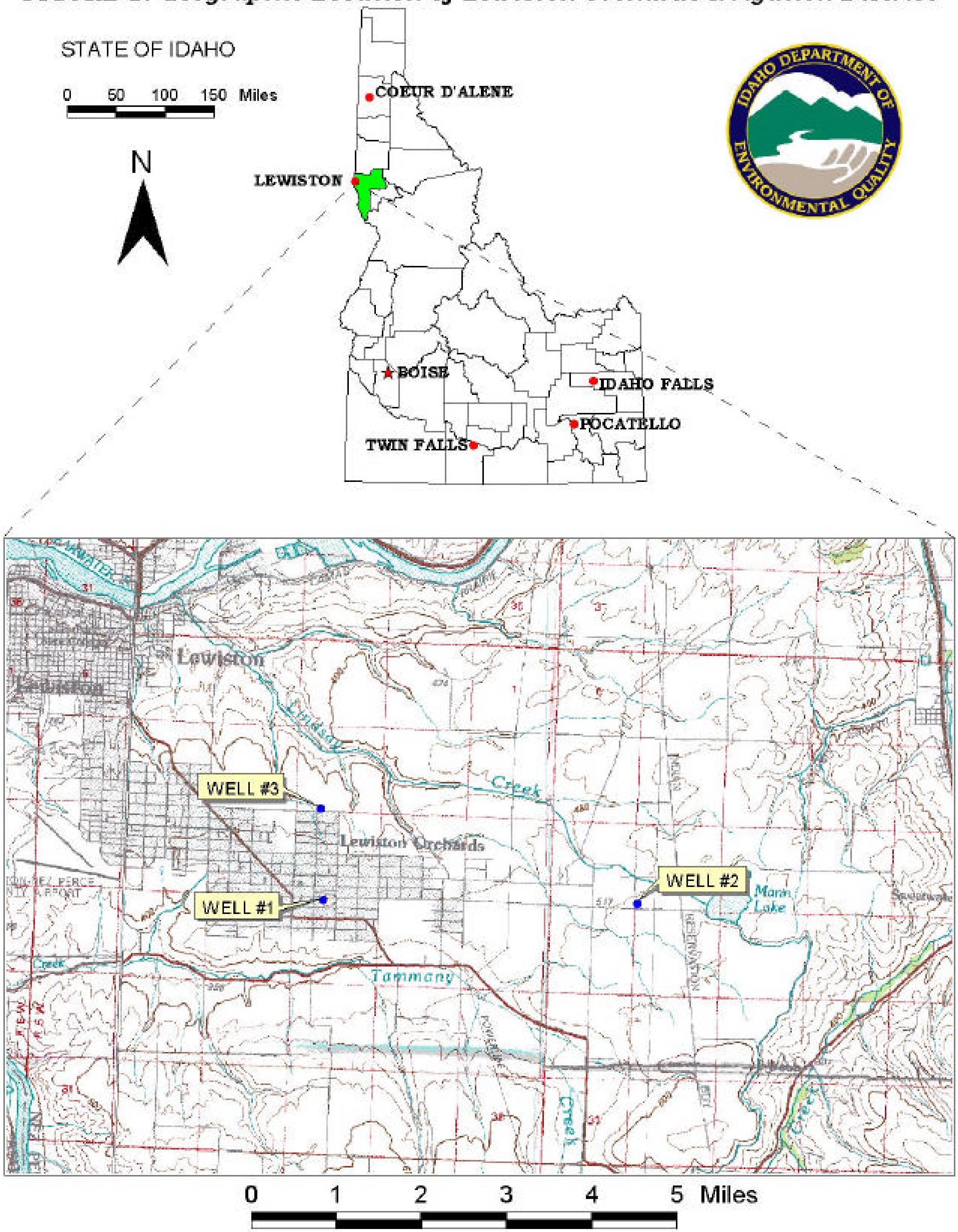
Major faults, anticlinal folds, and a major topographic divide (the Blue Mountains) have been assumed by various parties (EPA, 1988; Wyatt-Jaykim, 1994) to provide the regional impermeable boundaries of the Lewiston Basin Deep Aquifer. To the north, the aquifer is bounded by the Clearwater Escarpment, commonly referred to as the Lewiston Hill. Faults at the toe of Lewiston Hill include the Vista and Wilma faults. The northeastern boundary of the Lewiston Basin Deep Aquifer is taken to be the Cottonwood Creek Fault. The southeastern boundary is the Limekiln fault along the front of the Craig Mountains, which meets the Snake River at Limekiln rapids. From the Snake River westward, the Grande Ronde fault is considered to be the southern boundary of the Aquifer, until it meets the Blue Mountain topographic divide. This major topographic divide is assumed to be a regional groundwater divide.

Within the Lewiston Basin Deep Aquifer, water is generally assumed to flow from recharge in the highlands to discharge into the Snake and Clearwater Rivers. In addition, Cohen and Ralston (1980) mapped areas of possible river/aquifer interconnection, and proposed that (a) the aquifer discharges to the Snake below Lewiston, and (b) the aquifer is recharged from surface water from Lapwai Creek plus the Clearwater in the reach intersecting Lapwai Creek, and (c) that the aquifer is recharged from surface water in the vicinity of the confluence of the Snake River with Asotin Creek. These locations for surface water recharge to the aquifer were postulated where the basalt aquifer was dipping away (downward) from the stream.

A component of vertical recharge into the Grande Ronde is assumed to exist in this basin because the basalts overlying the Grande Ronde are laterally discontinuous as a result of the many canyons which have been downcut into the Grande Ronde (EPA, 1988), and because the interbed (comprised of clay and saprolite) which forms the top of the Grande Ronde is believed to allow vertical percolation (EPA, 1988).

Precipitation is 13 inches/year in Lewiston-Clarkston, whereas higher elevation areas average close to 25 inches annually (Cohen and Ralston, 1980). A modeling effort documented by Wyatt-Jaykim (1994), concluded on the basis of available data that 1 to 2 inches/year is a conservative estimate for recharge to the Lewiston Basin Deep Aquifer in the vicinity of Lewiston and Lewiston Orchards.

FIGURE 1. Geographic Location of Lewiston Orchards Irrigation District



The capture zones delineated herein are based upon limited data and must be taken as best estimates. If more data become available in the future these delineations should be adjusted based on additional modeling incorporating the new data.

The delineated source water assessment areas for the well of Lewiston Orchards Irrigation District can best be described as east-southeast trending elliptically shaped corridors approximately 2 miles long and are approximately 1-1.5 miles at their widest points (Figure 2, 3, 4). The actual data used by the University of Idaho in determining the source water assessment delineation area is available from DEQ upon request.

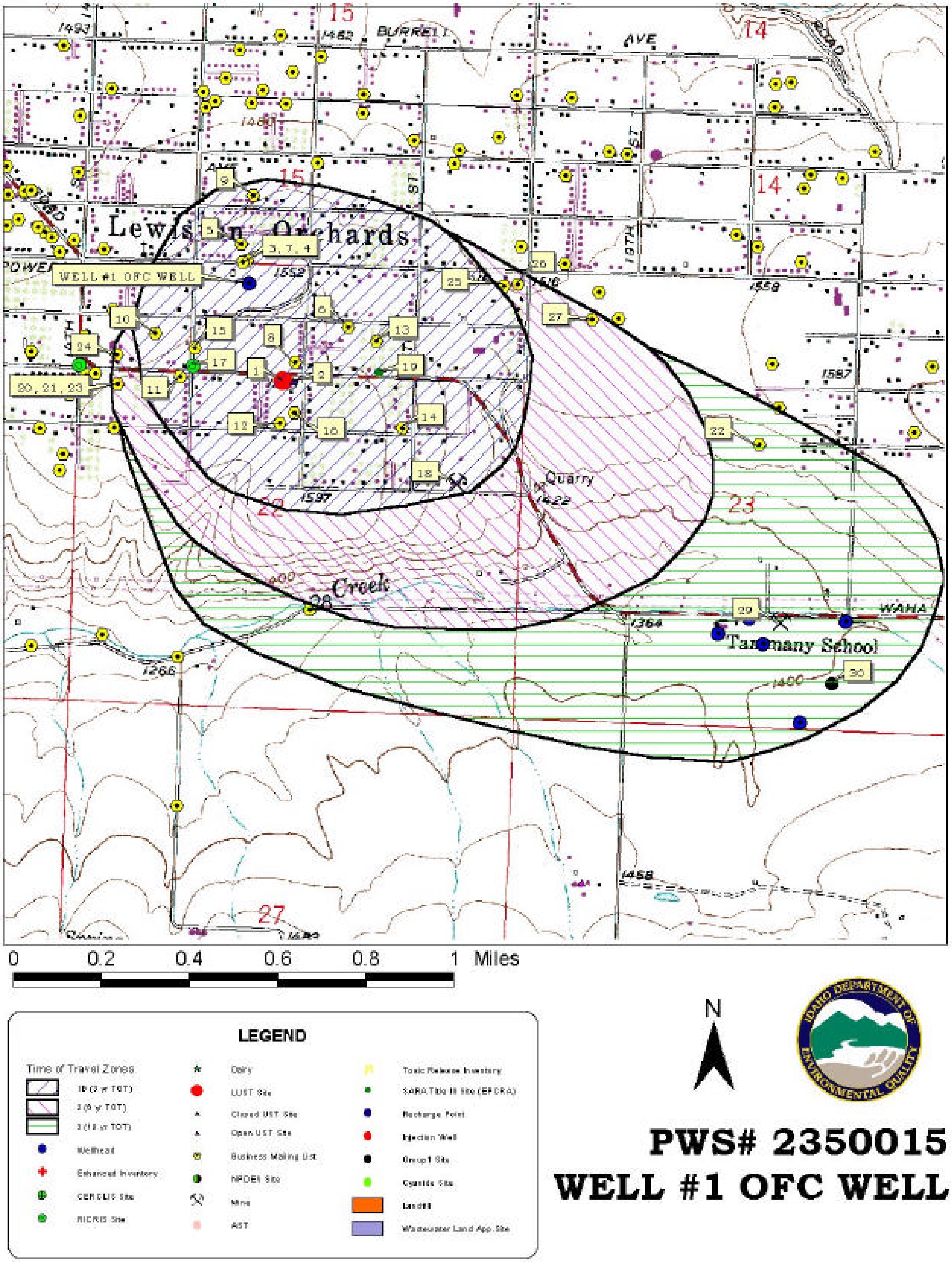
Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area and the surrounding area of the Lewiston Orchards Irrigation District wells contains equal amounts of urban and rural/agriculture.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Figure 2. Lewiston Orchards Irrigation District Delineation Map and Potential Contaminant Source Locations



PWS# 2350015
WELL #1 OFC WELL

Figure 3. Lewiston Orchards Irrigation District Delineation Map and Potential Contaminant Source Locations

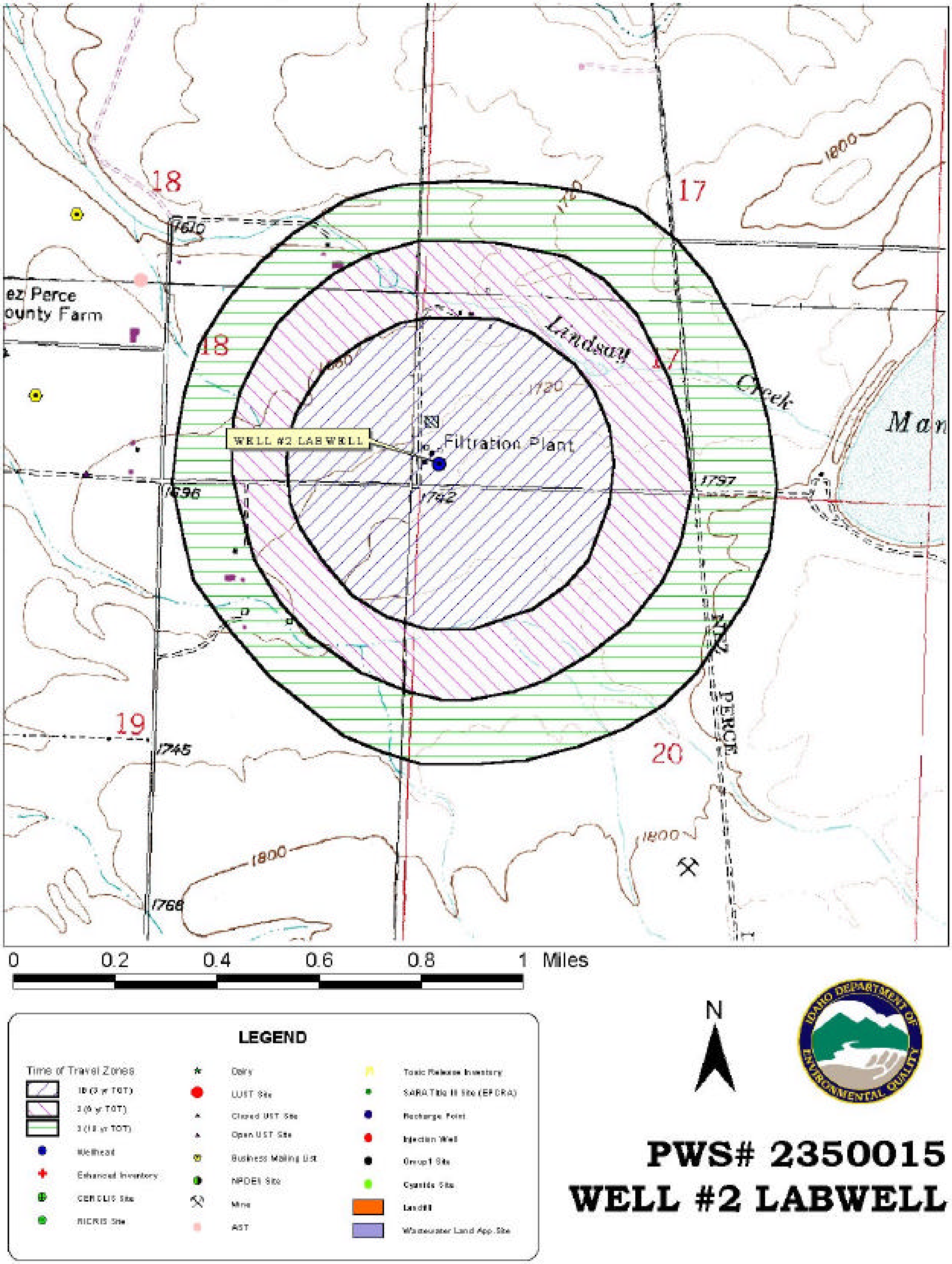
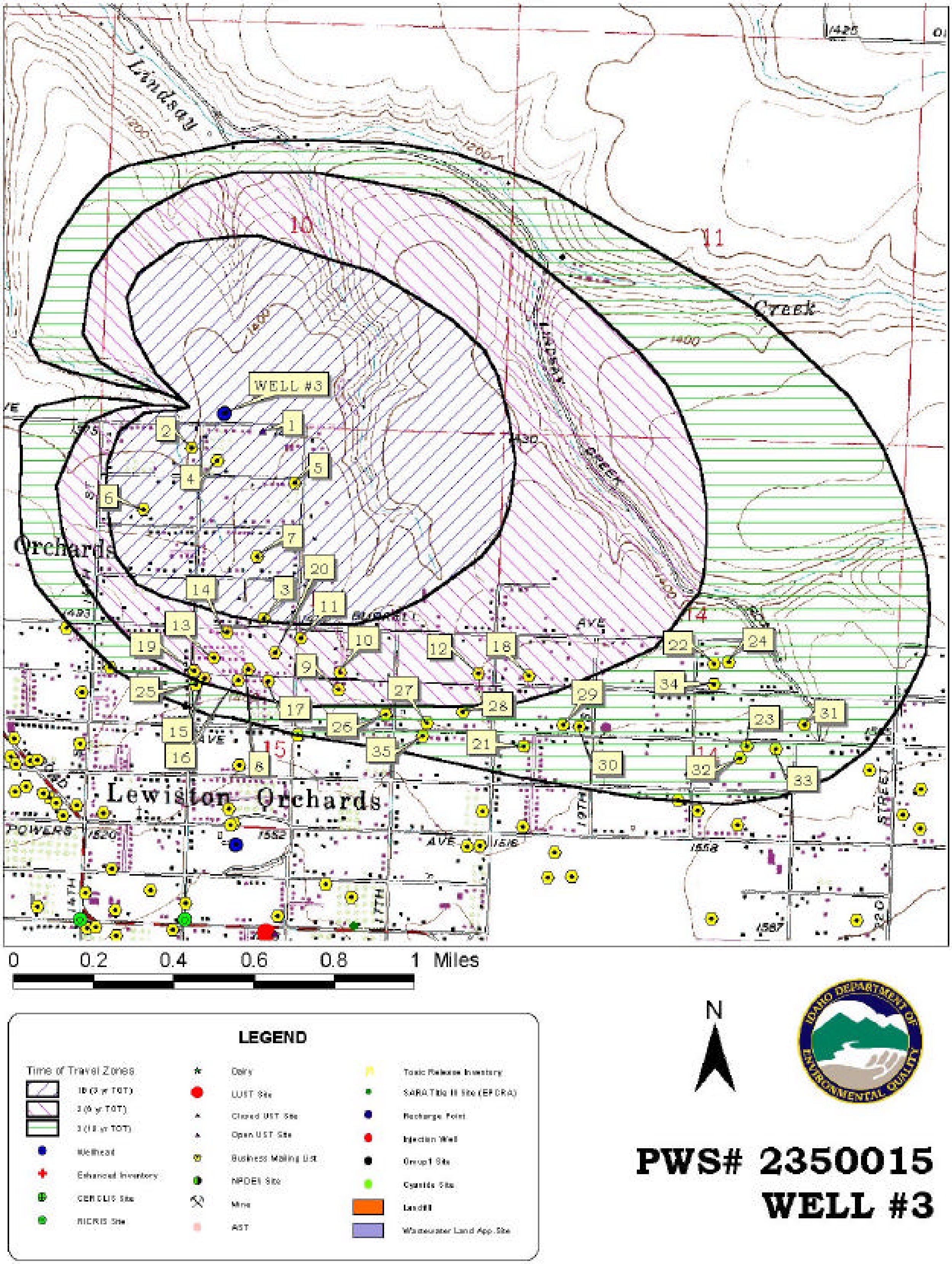


Figure 4. Lewiston Orchards Irrigation District Delineation Map and Potential Contaminant Source Locations



Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in March 2002. The first phase involved identifying and documenting potential contaminant sources within the Lewiston Orchards Irrigation District source water assessment areas (Figure 2 and 4) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water assessment areas of the Lewiston Orchards Irrigation District wells contain many service and industrial related industries and Thain Road (Tables 1, 2 and Figures 2, 3, 4). These sources can contribute leachable contaminants to the aquifer in the event of an accidental spill, release, or flood.

Table 1. Lewiston Orchards Irrigation District Well #1, Potential Contaminant Inventory.

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
1, 2	Site Cleanup Completed , Impact: GROUND WATER, LUST site, UST site	3 YR	Database Search	VOC, SOC
3,7	Water & Sewage Companies-Utility, UST site	3 YR	Database Search	IOC, VOC, SOC, Microbials
4	Sewage Disposal Systems	3 YR	Database Search	IOC, VOC, SOC, Microbials
5	General Contractors	3 YR	Database Search	IOC, VOC, SOC
6	General Contractors	3 YR	Database Search	IOC, VOC, SOC
8	Trucking-Heavy Hauling	3 YR	Database Search	VOC, SOC
9	BUILDING & PROPERTY MAINTENANCE	3 YR	Database Search	IOC, VOC, SOC
10	APPLIANCE REPAIR	3 YR	Database Search	IOC, VOC, SOC
11	SIGN MANUFACTURING	3 YR	Database Search	IOC, VOC, SOC
12	RESIDENTIAL CONSTRUCTION	3 YR	Database Search	IOC, VOC, SOC
13	CONSTRUCTION, REMODELING & REPAIR	3 YR	Database Search	IOC, VOC, SOC
14	BUILDING CONTRACTOR	3 YR	Database Search	IOC, VOC, SOC
15	CONIFER SEEDLING NURSERY (GREENHOUSE)	3 YR	Database Search	IOC, VOC, Microbials
16	CONSTRUCTION MANAGEMENT	3 YR	Database Search	IOC, VOC, SOC
17	RCRA site	3 YR	Database Search	IOC, VOC, SOC
18	Sand & Gravel pit	3 YR	Database Search	IOC, VOC, SOC, Microbials
19	SARA site	3 YR	Database Search	IOC, VOC, SOC
20	Storage-Household & Commercial	6 YR	Database Search	IOC, VOC, SOC
21	Mining Equipment (Wholesale)	6 YR	Database Search	IOC, VOC, SOC
22	Janitor Service	6 YR	Database Search	IOC, VOC, SOC
23	Truck Renting & Leasing	6 YR	Database Search	VOC, SOC
24	TRUSS MANUFACTURING	6 YR	Database Search	IOC, VOC, SOC
25	CONSTRUCTION	6 YR	Database Search	IOC, VOC, SOC
26	GARAGE DOOR SALES, INSTALLATION	6 YR	Database Search	None
27	MASONRY & CONCRETE CONTRACTOR	10 YR	Database Search	IOC, VOC, SOC
28	GENERAL CONTRACTORS	10 YR	Database Search	IOC, VOC, SOC
29	Clay mine	10 YR	Database Search	IOC, VOC, SOC
30	Group 1	10 YR	Database Search	IOC, VOC, SOC

[1] UST =Underground Storage Tank, SARA = Superfund Amendments and Reauthorization Act, AST = Aboveground Storage Tanks, RCRA = Resource Conservation Recovery Act, NPDES = National Pollutant Discharge Elimination System
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Lewiston Orchards Irrigation District East Well #3, Potential Contaminant Inventory.

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
1	State Government; Closed, UST site	3 YR	Database Search	VOC, SOC
2	General Contractors	3 YR	Database Search	IOC, VOC, SOC
3	Parking Area Maintenance & Marking	3 YR	Database Search	IOC, VOC, SOC, Microbials
4	PORTABLE WELDING SERVICE	3 YR	Database Search	IOC, VOC, SOC
5	LAWN & GARDEN MAINTENANCE	3 YR	Database Search	IOC, SOC, Microbials
6	UNDERGROUND SPRINKLER SYSTEMS SALES	3 YR	Database Search	IOC, VOC, SOC
7	REPAIR & SHARPENING OF ELECTRIC CLIPPERS	3 YR	Database Search	None
8	Mobile Homes-Repairing & Service	6 YR	Database Search	IOC, VOC, SOC
9	Laboratories-Dental	6 YR	Database Search	IOC, VOC, SOC
10	Automobile Wrecking (Wholesale)	6 YR	Database Search	IOC, VOC, SOC
11	Landscape Contractors	6 YR	Database Search	IOC, SOC
12	Tree Service	6 YR	Database Search	IOC, SOC
13	JANITORIAL SERVICES	6 YR	Database Search	IOC, VOC, SOC
14	CONSTRUCTION GENERAL CONTRACTOR	6 YR	Database Search	IOC, VOC, SOC
15	CONSTRUCTION	6 YR	Database Search	IOC, VOC, SOC
16	GENERAL CONTRACTING	6 YR	Database Search	IOC, VOC, SOC
17	DIGITAL PHOTO RESTORATION	6 YR	Database Search	IOC, VOC
18	PHOTOGRAPHY	6 YR	Database Search	IOC, VOC
19	GENERAL CONSTRUCTION & ROOFING CONTRACTOR	6 YR	Database Search	IOC, VOC, SOC
20	CONSTRUCTION	6 YR	Database Search	IOC, VOC, SOC
21	Carpet & Rug Cleaners	10 YR	Database Search	IOC, VOC, SOC
22	Mining Equipment (Wholesale)	10 YR	Database Search	IOC, VOC, SOC
23	General Contractors	10 YR	Database Search	IOC, VOC, SOC
24	Photographers-Portrait	10 YR	Database Search	IOC, VOC
25	Electric Equipment & Supplies	10 YR	Database Search	IOC, VOC
26	LAPIDARY, SPECIALTY ROCK, RUBBER STAMP	10 YR	Database Search	IOC, VOC, SOC
27	HOME REPAIRS, REMODELING, CONCRETE	10 YR	Database Search	IOC, VOC, SOC
28	GENERAL CONTRACTOR	10 YR	Database Search	IOC, VOC, SOC
29	CARPET INSTALLATION	10 YR	Database Search	VOC
30	AMUSEMENT RENTAL; SLOT CAR RACING	10 YR	Database Search	IOC, VOC, SOC
31	RETAIL & MANUFACTURING OF PORTABLE S	10 YR	Database Search	IOC, VOC, SOC
32	PAINTING, ROOFING, CARPET & VINYL	10 YR	Database Search	IOC, VOC, SOC
33	CONCRETE CURBING CONTRACTOR	10 YR	Database Search	IOC, VOC, SOC
34	MANUFACTURING OF BULLETS	10 YR	Database Search	IOC, VOC, SOC
35	RESIDENTIAL CONSTRUCTION, DECKS & SIDING	10 YR	Database Search	IOC, VOC, SOC

[1] UST =Underground Storage Tank, SARA = Superfund Amendments and Reauthorization Act, AST = Aboveground Storage Tanks, RCRA = Resource Conservation Recovery Act, NPDES = National Pollutant Discharge Elimination System
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Well #1 rated moderate for hydrologic sensitivity. Regional soil classification rates the delineation as underlying poorly to moderately drained soils, the vadose zone is predominantly impermeable, and the depth to first water is more than 300 feet. The rating was increased due to a missing aquitard between the water table and producing zone of the well.

Well #2 rated moderate for hydrologic sensitivity. Soils are poorly to moderately drained and an aquitard is present. However, the rating was increased because the water table is less than 300 feet and the vadose zone is highly permeable.

Well #3 rated low for hydrologic sensitivity. Soils are slowly drained, an aquitard is present, and the water table is more than 300 feet deep. The rating was increased because the vadose zone is predominantly fractured basalt and permeable.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

Well #1 and Well #2 rated moderate, and Well #3 rated low for system construction. All three wells were located outside of the 100 year floodplain, have adequate wellheads and surface seals, and produced their water more than 100 feet below their water tables. Well #1 and Well #2 did not have casings that extended into low permeability units. Because of a missing sanitary survey during the analysis, it is unknown if any of the wells meet Idaho Code for construction. In all three wells, the casings for at least one of the sections was thinner than current regulations require.

Though the wells may have been in compliance with standards when they were completed, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. These standards include provisions for well screens, pumping tests, and casing thicknesses to name a few. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Casings more than 22 inches in diameter should be 0.5 inches thick. Twelve to 20-inch casings require a thickness of 0.375 inches thick. Ten inch casings should be 0.365 inches thick. As such, the wells were assessed an additional point in the system construction rating.

Potential Contaminant Source and Land Use

Land use scores are divided into four categories, IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products, chlorinated solvents), and SOCs (i.e. pesticides), and microbial contaminants (i.e. bacteria). The number and location of potential contaminant sources within the delineation contributed to the land use scores.

Well #1 rated moderate for IOCs, VOCs, SOCs, and low for microbials. Well #2 rated low for all four categories. Well #3 rated moderate for IOCs, VOCs, SOCs, and low for microbials.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. In this case, Well #2 rated automatically high to VOCs due to a detection of xylene in the well. Additionally, if there are contaminant sources located within 50 feet of the source then the wellhead will automatically get a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking.

Table 3. Summary of Lewiston Orchards Irrigation District Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	M	M	M	L	M	M	M	M	M
Well #2	M	L	L	L	L	M	M	H*	M	M
Well #3	L	M	M	M	L	L	L	L	L	L

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = Automatic high susceptibility due to xylene detection in well

Susceptibility Summary

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In terms of total susceptibility, Well #1 and Well #2 rated moderate for IOCs, VOCs, SOCs, and microbials.

In terms of total susceptibility, Well #2 rated moderate for IOCs, automatically high for VOCs, and moderate for SOCs and microbials. The automatically high VOC rating is due a xylene (4/96) detection in the well.

In terms of total susceptibility, Well #3 rated low for IOCs, VOCs, SOCs, and microbials.

Traces of the IOCs barium, chromium, fluoride, magnesium, manganese, potassium, and selenium have been detected in all three wells, but at levels significantly lower than allowable limits. Despite the present and historical agricultural activities surrounding the wellheads, no nitrate has ever been detected in any of the wells. No SOCs have ever been detected in the wells. The disinfection by-products Bromodichloromethane, bromoform, and bromomethane were detected in all three wells.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the Lewiston Orchards Irrigation District, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Efforts should be made to reduce the amount of disinfection byproducts in the wells. As much of the designated protection areas are outside the direct jurisdiction of the Lewiston Orchards Irrigation District, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. In 1983, EPA identified some technologies, treatment techniques and plant modifications that water systems could use to reduce the amount of disinfection by-products produced. See http://www.epa.gov/safewater/mdbp/pdf/alter/chapt_2.pdf for disinfection by-product control strategies.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation encompasses urban and commercial land uses. Public education topics could include proper lawn and garden care practices, hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office	(208) 799-4370
State DEQ Office	(208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper, Idaho Rural Water Association, at 1-800-962-3257 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund@ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Cohen, P.L. and Ralston, D.R.; 1980; Reconnaissance study of the “Russell” Basalt aquifer in the Lewiston Basin of Idaho and Washington, Research Technical Completion Report, Idaho Water Resources Research Institute, University of Idaho, 164p.

Crosthwaite, E.G; 1989; Results of Testing Exploratory Wells, Nez Perce Reservation, ID. Contractor (P.G.) report.

EPA; 1988; Support Document for Designation of the Lewiston Basin Aquifer as a Sole Source Aquifer. Office of Ground Water. EPA 910/0-88-194.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. “Recommended Standards for Water Works.”

Hydrology Program; 1984; Analysis of Aquifer Test Data from the Grande Ronde Formation, Clarkston, Washington, and Lewiston Idaho. Department of Geology and Geological Engineering, University of Idaho, Moscow, Idaho 83843.

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Rember, W.C. and E.H. Bennett, 1979; Geologic Map of the Pullman Quadrangle, Idaho, Idaho Bureau of Mines and Geology, Moscow, ID.

Wyatt-Jaykim Engineers; 1994; Lewiston Basin deep aquifer study, Prepared for Lewiston Orchards Irrigation District (LOID).

Appendix A

Lewiston Orchards Irrigation District
Susceptibility Analysis
Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

Public Water System Name : LEWISTON ORCHARDS IRRIGATION DIST

Well# : WELL #1 OFCWELL

Public Water System Number 2350015

04/03/2002 9:55:36 AM

1. System Construction

		SCORE
Drill Date	02/03/1978	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity

		SCORE
Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		2

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	15	17	16	4
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	2	2	2	
4 Points Maximum		2	2	2	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		10	10	10	8

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	25 to 50% Irrigated Agricultural Land	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		20	18	20	9

4. Final Susceptibility Source Score

	IOC Score	VOC Score	SOC Score	Microbial Score
4. Final Susceptibility Source Score	9	9	9	10

5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report Public Water System Name :
LEWISTON ORCHARDS IRRIGATION DIST Well# : WELL #2 LABWELL
Public Water System Number 2350015 04/03/2002 9:55:55 AM

1. System Construction		SCORE
Drill Date	08/05/1986	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		2

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	YES	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		3	1	3	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
4 Points Maximum		0	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		2	2	2	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		1	1	1	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	

		IOC	VOC	SOC	Microbial
Total Potential Contaminant Source / Land Use Score - Zone III		1	1	1	0
Cumulative Potential Contaminant / Land Use Score		7	5	7	3
4. Final Susceptibility Source Score		6	6	6	6
5. Final Well Ranking		Moderate	High	Moderate	Moderate

Ground Water Susceptibility Report Public Water System Name :
LEWISTON ORCHARDS IRRIGATION DIST Well# : WELL 3
Public Water System Number 2350015 04/03/2002 9:56:13 AM

1. System Construction		SCORE
Drill Date	11/11/1997	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		1

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		1

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		3	1	3	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	5	5	6	2
(Score = # Sources X 2) 8 Points Maximum		8	8	8	4
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		9	9	9	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	

Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		1	1	1	0
Cumulative Potential Contaminant / Land Use Score		16	14	16	5
4. Final Susceptibility Source Score		5	5	5	4
5. Final Well Ranking		Low	Low	Low	Low